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November 15, 2002

William G. Pennington
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814-5512

Subject: 2005 Energy Efficiency Standards – Outdoor Lighting

Dear Bill:

Acuity Lighting Group is the largest manufacturer of luminaires and lighting equipment in North America. The California lighting market is estimated at just under $1 billion and represents around 11% of the total US market. Acuity Lighting Group provides one of the widest selection of lighting products and is one of the top suppliers of products to California.

As you know, we have worked extensively with the Commission and your contractors on the outdoor lighting measures for over a year to develop reasonable and meaningful standards for outdoor lighting. These proposed measures have resulted from requirements in SB5X that state *"The commission shall adopt efficiency standards for outdoor lighting. The standards shall be technologically feasible and cost effective."* The following comments are being submitted based on Draft 2 - November 2002, 2005 Energy Efficiency Standards for Residential and Nonresidential Buildings.

It has been a challenge to evaluate this November CEC draft since the draft was posted with only nine working days to review prior to the workshop coupled with the fact that the lighting requirements have been sorted into a variety of different sections within the draft.

I am pleased to see that the proposed standards have specifically stated exceptions for street and roadway lighting, sports lighting, industrial sites and lighting required by the FAA or Coast Guard. I recommend that you change "temporary lighting *strings*" to simply "temporary lighting". This will exempt lighting that is used for various temporary purposes such as construction sites or other necessary temporary lighting in addition to holiday lights. In addition, if FAA and Coast Guard lighting will be exempted, you should also provide exceptions for other branches of Defense facilities. I would also suggest that you provide exceptions for the other applications listed in the June 6, 2002 draft, page 1, Scope, "Standards are not being considered for:".

LIGHTING ZONES:

With regard to the Lighting Zones, I will repeat previous comments we have submitted on several occasions. In theory, we believe the "Lighting Zones" can be a

useful concept for lighting standards. They provide flexibility to set guidelines based on different objectives within each zone. However, there are a number of concerns and issues related to how these zones as currently described by the CEC would be defined and enforced at the local level. The CEC proposal forces virtually all outdoor lighting applications into a Zone 2 or 3 requirement, which does not allow enough flexibility for the diversity of demographics within the state. There are no defaults for areas under LZ4 and there are concerns with regard to the restrictions on the size of LZ4. This may impose unreasonable restrictions on municipalities that place a local emphasis on historic or decorative themes or those areas that have greater security requirements.

SCOPE Of PROPOSALS:

I was surprised to see new application categories added to the proposed standard that have not been included in any previous drafts. None of the previous drafts referenced standards for "Hardscape Plazas", "non-sales canopies" or "Retail Gas and Vehicle Service Station without Canopy". What has precipitated these changes in the proposed standards and how are these additions justified at this time?

The LPD allowances for "Hardscape Plazas" has been combined with "Parking Lots", however the visual tasks for these two types of applications are very different. It seems unreasonable to combine these two applications into the same power density without a full analysis of the lighting performance for each type. "Hardscape Areas" were referenced in the June draft under "Building Grounds". It appears that "Building Grounds" are now broken out as "Hardscape Plazas" and walks, bikeways, paths and drives. However the June draft referenced much higher power density requirements for "Hardscape Areas" (such as 0.35 watts/sf for LZ2) than for Parking Lots where they are now covered (0.06 watts/sf for LZ2).

In the June 6 CEC draft, "Building Grounds" criteria was based on Lighting Power Density limits. In the November draft, this application type is now based on watts/linear foot, however there is nothing in the report that explains the reasons for changing the measurement metric, nor is there any models provided to support the proposed values. Without a model, it is unclear if the November recommendations will account for walks, bikeways and paths that are very wide and require illumination from both sides of the area.

The November draft also introduces new definitions such as "area of influence" and "vertical area of influence". It is unclear what the purpose of these items are and how they apply to this standard.

It has been very difficult to provide meaningful comments on the outdoor standards when each draft seems to change in terms of the scope or approach to the measurement criterion. I believe many of these changes were made in an attempt to address comments from the June draft, however it is unreasonable to introduce new applications or measures into the 2005 standards at this point in the process.

TECHNICAL MODELS:

Various industry representatives, including myself, have repeatedly requested information from the CEC regarding the models used to substantiate the proposed power limits. I am aware that a supplemental report was issued, dated June 25, 2002. However this supplemental report provided very little additional detail that wasn't already in the June 6 report. I will reiterate my concerns with regard to the models used to support the proposed requirements.

1. The proposed LPD for the parking lot measure is based on a model that results in poles being located in the driving lanes of the lot. In actual applications, there are various constraints on where poles can be located that are not accounted for in the CEC model.
2. The model for the parking lot measure is based on an analysis area that is in the middle of the parking lot. Therefore the results in the CEC model provide higher average and minimum illuminance values as well as superior uniformity than would actually be achieved. The November draft defines the calculation for the allowed lighting power based on the "illuminated area". The CEC definition of the "illuminated area" is the total area of the lot, plus a perimeter of 10 feet around it, less any area within 5 feet of a building. Therefore the proposed Lighting Power Density values are too restrictive based on the difference in the area assumed in the model versus the whole site required for the LPD calculation.
3. The CEC references the IESNA RP-20 recommended illuminance values for the Zone 2 and 3 parking lot proposals, and the model uses those exact illuminance values to determine the maximum power density. RP-20 clearly states those recommendations as a *minimum* illuminance recommendation. Applying those values in the CEC model as the maximum illuminance allowed and modeling them only in the center of a parking lot does not provide an accurate representation of the lighting power required to meet industry standards. Furthermore, the CEC models have made assumptions with regard to the illuminance levels and lighting zones that are not supported by any industry standards. For instance the minimum "basic security" illuminance level in RP-20 is used in the CEC model for Zone 2. The minimum "enhanced security" illuminance level is used for the Zone 3 model. This implies that only the minimum illuminance is required and that only Zone 3 would have the need for enhanced security.
4. The CEC models for various measures are based on light sources, pole heights and/or luminaires that are rarely used for those applications. For instance, the parking lot model does not use sources greater than 250W, however over 60% of the products used in commercial applications use sources over 250W. The product used in the CEC model for the service station canopy has never been sold for use by a service station to my knowledge. The luminaire used in the model has significantly different optical distribution and does not provide the vertical illuminance required to meet the requirements for this type of application.
5. Most of the measures for outdoor lighting developed recommendations based on only one, or very few models. In the case of the sign lighting measures, I have yet to see any data for the models supporting the proposed LPD values. It is unreasonable to think that one model can be used to substantiate values that will

be mandated for a wide variety of applications across the entire state of California.

All of these issues have been brought forward to the commission and their contractors on multiple occasions, yet we have never received an answer from staff regarding these issues.

SAFETY AND SECURITY ISSUES:

The CEC proposal does not allow for consideration of safety or security. IESNA RPs recognize the need for higher illuminance levels when enhanced security is required. I have not seen anything in the previous CEC drafts nor in the November draft that allow a lighting designer to address security requirements. In the an email from Commission staff dated August 16,2002, it was stated “Our standards cannot sanction practices and equipment that are known to pose a risk to the general public.” Many businesses and public safety officials agree that reduced light levels will pose a potential safety risk to the public. The American Society of Safety Engineers released an update in October 2002 containing a checklist for increasing workplace safety and security. One of the items on this checklist to improve security specifically recommends increasing outdoor lighting.

CUTOFF CONTROL

The cutoff control requirements have been somewhat confusing since they have been extracted from the proposed outdoor lighting standards and inserted into the lighting controls section. The requirements as described in section 130(d) have identified a scope of applications that is more appropriate than the requirement for all nine measures in the June 6 draft. I appreciate the consideration of the Commission with respect to the scope of applicability of cutoff optics. It should be noted however that there are inconsistencies in how different measures or applications are described for outdoor lighting in the lighting controls section (section 130) and the outdoor lighting section (section 133).

The cutoff requirements are proposed for 175W sources and greater, therefore the proposal allows 150W HPS sources but does not allow 175W MH sources. A 150W HPS and 175W MH will produce very similar brightness characteristics, and various industry studies suggest that the spectral content of MH lamps provides better nighttime visibility than HPS. Therefore it is appropriate that the draft be modified from “…lamps rated 175 watts or greater…” to “…lamps rated greater than 175 watts…”. As previously illustrated to the Commission, cutoff optics will consume more energy than less restrictive optics due to a smaller area of distribution per luminaire. However, I believe that placing the cutoff control requirement only on the applications listed in this November draft and for products greater than 175 watts, there is a reasonable balance between energy and visibility considerations.

The commission is also encouraged to consider exceptions to the cutoff criteria as previously recommended by NEMA. These exceptions should include: compelling safety or security concerns, areas that require special aesthetic needs or vertical illuminance criteria that cannot be met with cutoff optics and special

public events. Based on my evaluation of the November CEC draft, other exceptions recommended by NEMA such as temporary lighting and lighting to enhance the beauty of an object are not in the scope of requirements for the cutoff control. If my assessment is incorrect, these applications should also be included as an exception.

CURFEWS:

We had originally agreed with the concept of curfews for outdoor lighting. This is a concept that seems to have benefits of saving energy and reducing environmental impact for non-critical outdoor lighting. However, after careful review of commercially available products, we advised the commission in July that reducing the wattage by 50% per luminaire cannot be accomplished with commercially available products at this time. We explained that the switch dimming capabilities used for indoor HID warehouse lighting are not readily adapted to all outdoor luminaires due to the increased size of the ballast components.

CEC staff have commented numerous times that the curfew requirements in this standard would not be enforced. If this criteria remains in the standard, individual municipalities will have the opportunity to enforce curfews. A lack of enforcement creates a burden on manufacturers to rush to develop compliant products when there may be a very limited market opportunity. Lack of enforcement also creates a situation where California will expect energy savings or demand reduction that will not be realized, further promulgating blackout situations in the future.

CEC has suggested an alternative solution to reduce the overall wattage of the site by 50% by switching off every other pole in a lot. This alternative would create a serious risk to public safety due to the potential for dark areas and extreme uniformity ratios.

Finally, it is a requirement for these standards to be justified as being cost effective. I have not seen any justification for the cost effectiveness for the curfew requirement.

To summarize, we have asked the Commission for the rationale for the outdoor lighting categories ever since SB5X was approved and have not received any information that describes the energy savings potential, demand reduction or cost effectiveness analyses. We continue to have questions with regard to the scope and justification of the outdoor lighting measures.

The IESNA has agreed to review and revise all outdoor lighting Recommended Practices to address lighting zones, curfews and illuminance levels. Since no standards exist for this approach today, it is premature for the Commission to proceed without these updated industry standards.

It is my recommendation that the Commission postpone any outdoor lighting standards in California until the process can be conducted in a manner that is based on solid technical criteria approved by the lighting industry, the measures can be accomplished with technologically feasible products that are commercially available and focused on those application categories that can be justified as conserving energy, reducing electric peak demand and are proven to be cost effective. If postponement is not feasible, then it is recommended that the CEC scale back the scope of the outdoor lighting standards as requested since the very first workshop in March. We will be glad to work with the CEC and your contractors to develop reasonable standards for those areas that represent the highest potential for energy savings.

Thank you for your time and consideration of these comments.

Best regards,

Cheryl English
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